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Part I

Understanding PivotTables and Charts

In this part you learn about PivotTables and PivotCharts, which are powerful data-analysis tools in Excel. They are invaluable for pulling meaning from huge masses of seemingly meaningless data. Given their power, PivotTables and PivotCharts are surprisingly easy to use, but using them still involves many unavoidable complexities. This book teaches you how to use PivotTables and PivotCharts efficiently and effectively. As the first step, you need to understand what these tools are and when you might want to use them.

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Understanding How PivotTables Work

PivotTables enable you to extract meaning from large amounts of data. This description is deceptively simple because in fact PivotTables are powerful and sophisticated tools that enable you to do things that would be impossible or difficult to do any other way. A PivotTable enables you to take what seems to be an indecipherable mass of facts and extract any trends and patterns buried in the data. You can organize and summarize your data, perform comparisons, and extract meaningful information that can be invaluable to you and your organization.

Why the term *pivot?* It comes from an analogy between the way PivotTables work and the way you investigate a physical object. Imagine that you have been handed a complex device and asked to figure out what it does. You don't just look at it from one angle; rather you turn it in your hands, examining it from all possible perspectives to be sure you do not miss any important clues. PivotTables work the same way, enabling you to turn or pivot the raw data and examine it from various perspectives to extract the information you need. Then you also have the option of creating a *PivotChart,* a graphical representation of the information in a PivotTable.

Suppose you work for a chain of sporting-goods stores. Every day you receive a report from each store that includes complete details on that day's activities, such as number of customers each hour, sales in each of 30 categories, items returned for refund or exchange, and number of employees on duty at different times of the day. It won't be long before your Excel workbook is chock-full of this raw data, but what good does it do you? You could stare at this information for hours without gaining any useful insights from it. But with a PivotTable you can quickly and easily answer the following types of questions:

- Which days of the week show the highest sales?
- Which categories of merchandise sell best at different times of the year?
- Are more employees scheduled to work when there is the highest customer load?
- Do certain categories of merchandise suffer from unusually high rates of return/exchange?

These are the kinds of questions that a business needs to answer in order to operate efficiently. These are also the kinds of questions that PivotTables are designed to answer. The same kinds of analysis are appropriate for almost any kind of data you can imagine, from political surveys to weather patterns, from quality control in a manufacturing plant to test scores in a high school. That's the beauty of PivotTables — they are powerful *and* flexible.

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What About Crosstab Tables?

If you have used older versions of Excel, you may be wondering how PivotTables relate to another Excel data analysis technique, the crosstab table. The fact is that PivotTables are a replacement for crosstabs, which are not even supported in newer versions of Excel. PivotTables are significantly more powerful than crosstabs and are easier to use. If you find yourself working with an old workbook that contains a crosstab table, your best bet is to convert it to a PivotTable report. Then you'll have the power of the PivotTable at your fingertips if you need to change the way the data is analyzed. To convert a crosstab to a PivotTable, follow these steps:

1. Open the workbook that contains the crosstab table.
2. Click any cell in the crosstab table.
3. Select Pivot Table and Pivot Chart Report from the Data menu.
4. Click Finish and then click OK in response to any prompts.
5. Save the workbook in the current Excel version.

Of course you should not do this if you or someone else will later need to open the workbook in the older version of Excel.

Working with PivotTables

I could talk about PivotTables until I am blue in the face, but it's much better to actually show an example. By looking at the kind of data that PivotTables are used for, and seeing the resulting PivotTable in action, you will get a good understanding of the what and why of this powerful tool.

Figure 1.1 shows some data that are typical of the kind you would analyze using a PivotTable. These data are based on the sporting-goods store example I mentioned earlier. As with other examples in this book I have intentionally simplified the data to illustrate the points I am trying to make without confusing you with unnecessary details. You should not think that PivotTables are limited to relatively simple data such as these!

What questions might you want to ask about these data? Here are a few that come to mind:

- What are the sales for the Camping category for each region?
- In each store, which days of the week see the most customers?
- In each store, which category has the highest sales?
- Which day of the week has the lowest total sales?

In the following demonstration you explore the first question. You create a PivotTable report that shows the total sales of goods in the Camping category subtotaled by region.

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	A	B	C	D	E	F	G	H	I	J	K
1											
2	Store	Region	Date	Customers	Total Sales	Camping	Fitness	Soccer	Baseball	Fishing	Football
3	2134	Northeast	06-Jun-05	207	$ 6,581	$ 326	$ 1,284	$ 970	$ 1,270	$ 1,488	$ 1,243
4	2134	Northeast	07-Jun-05	162	$ 3,584	$ 901	$ 247	$ 765	$ 1,251	$ 228	$ 192
5	2134	Northeast	08-Jun-05	188	$ 4,713	$ 837	$ 1,260	$ 959	$ 765	$ 179	$ 713
6	2134	Northeast	09-Jun-05	171	$ 5,263	$ 553	$ 1,134	$ 236	$ 1,353	$ 1,011	$ 976
7	2134	Northeast	10-Jun-05	64	$ 4,731	$ 775	$ 294	$ 1,480	$ 160	$ 864	$ 1,158
8	2134	Northeast	11-Jun-05	246	$ 3,853	$ 429	$ 853	$ 773	$ 760	$ 739	$ 299
9	2134	Northeast	12-Jun-05	63	$ 6,077	$ 1,075	$ 1,418	$ 659	$ 1,445	$ 1,340	$ 140
10	2298	Midwest	06-Jun-05	86	$ 4,075	$ 866	$ 399	$ 270	$ 690	$ 418	$ 1,432
11	2298	Midwest	07-Jun-05	234	$ 3,933	$ 1,056	$ 266	$ 781	$ 131	$ 1,376	$ 323
12	2298	Midwest	08-Jun-05	286	$ 3,818	$ 1,330	$ 459	$ 314	$ 1,119	$ 149	$ 447
13	2298	Midwest	09-Jun-05	99	$ 4,923	$ 456	$ 426	$ 368	$ 1,045	$ 1,453	$ 1,175
14	2298	Midwest	10-Jun-05	85	$ 5,084	$ 1,061	$ 729	$ 211	$ 939	$ 939	$ 1,205
15	2298	Midwest	11-Jun-05	218	$ 3,517	$ 1,191	$ 341	$ 123	$ 1,293	$ 300	$ 269
16	2298	Midwest	12-Jun-05	124	$ 4,435	$ 998	$ 581	$ 350	$ 1,249	$ 295	$ 962
17	2166	South	06-Jun-05	215	$ 8,625	$ 1,957	$ 1,995	$ 615	$ 1,623	$ 370	$ 2,065
18	2166	South	07-Jun-05	266	$ 5,902	$ 1,829	$ 612	$ 709	$ 878	$ 1,218	$ 656
19	2166	South	08-Jun-05	92	$ 8,032	$ 1,844	$ 1,099	$ 1,804	$ 1,005	$ 1,509	$ 771
20	2166	South	09-Jun-05	237	$ 7,786	$ 911	$ 1,470	$ 1,430	$ 787	$ 2,074	$ 1,114
21	2166	South	10-Jun-05	65	$ 7,669	$ 1,377	$ 2,092	$ 364	$ 1,793	$ 502	$ 1,541
22	2166	South	11-Jun-05	263	$ 5,211	$ 1,201	$ 360	$ 655	$ 522	$ 559	$ 1,914
23	2166	South	12-Jun-05	159	$ 9,388	$ 1,663	$ 1,978	$ 828	$ 1,375	$ 1,747	$ 1,797

Figure 1-1: The sample data.

Creating a PivotTable Report

In this section I will guide you through the steps required to create a report that answers the question posed above: What are the sales for the Camping category for each region?

To begin, you must start Excel and open the workbook that contains the raw data, `SportingGoodsRawData.xls`. This workbook is provided for download from `wiley.com/go/excelpivottables/`

Start by selecting PivotTable and PivotChart Wizard from the Data menu. Excel displays the first step of the wizard, as shown in Figure 1-2.

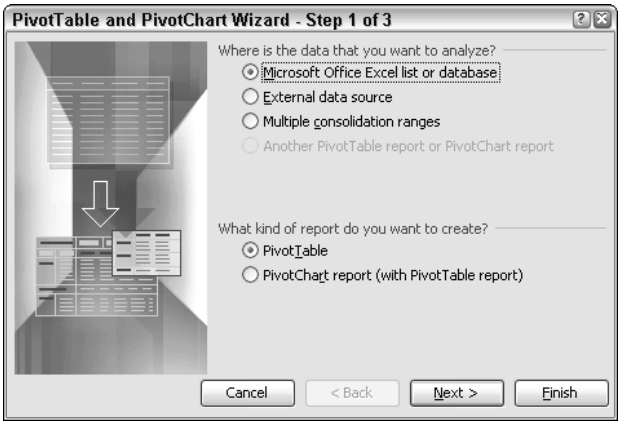
PivotTable and PivotChart Wizard - Step 1 of 3
Where is the data that you want to analyze?
Microsoft Office Excel list or database
External data source
Multiple consolidation ranges
Another PivotTable report or PivotChart report
What kind of report do you want to create?
PivotTable
PivotChart report (with PivotTable report)
Cancel
< Back
Next >
Finish

Figure 1-2: The first step of the PivotTable and PivotChart Wizard.

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In this dialog box, make sure that the options are selected as shown in the figure:

- Select Microsoft Office Excel list or database.
- Select PivotTable

Then click the Next button to move to Step 2 of the wizard, shown in Figure 1-3.

Figure 1-3: In the second step of the PivotTable and PivotChart Wizard you select the data on which the PivotTable will be based.

In the Range box you must enter the worksheet range that contains your raw data. In this example it is A2:K23. You can also click the Select button if you want to select the data range with the mouse, as follows:

1. Click the Select button. The dialog box collapses to a single line.
2. Drag the mouse over the desired data range. The range will be surrounded by an animated dashed border.
3. Click the Select button again. The dialog box expands to its normal size with the address of the selected data range entered in the Range field.

When you have the data range entered, click the Next button to move to the third and final step of the wizard, shown in Figure 1-4.

Figure 1-4: In the third and final step of the PivotTable and PivotChart Wizard you select the location for the new PivotTable.

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In this dialog box you specify where to place the PivotTable. You can also specify the table layout and set some options using the Layout and Options buttons, but that's a topic for a future part. For now just select the Existing Worksheet option and enter the address of a cell that is a few rows below the data, such as A28. Then click Finish to create the PivotTable report. Your screen will look like Figure 1-5.

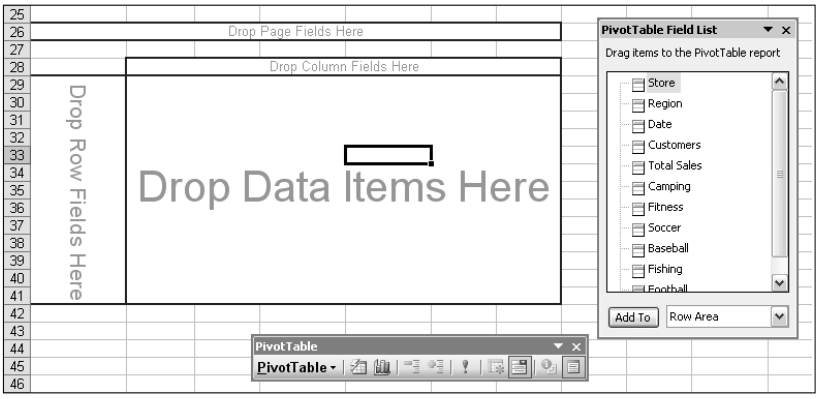

Figure 1-5: The newly created PivotTable report waiting to be customized.

Your screen displays three elements, as shown in the figure:

- The PivotTable itself, which is currently empty.
- The PivotTable toolbar, which provides buttons for commonly used PivotTable tasks and commands.
- The PivotTable Field List, which lists the data fields (columns) that are present in the raw data.

You will be learning all the details of these various elements in future parts. For now just follow the steps required to create the PivotTable report. This requires that you select the data items you want in the report and drag them from the PivotTable Field List to the appropriate location in the PivotTable report:

1. Drag the Region field from the PivotTable Field List and drop it in the Drop Row Fields Here section of the PivotTable.
2. Drag the Camping field from the PivotTable Field List and drop it in the Drop Data Items Here section of the PivotTable.

That's it; your PivotTable report is done and will appear as shown in Figure 1-6. The only remaining step is to format the numbers to display as currency by selecting the cells and clicking the Currency Style button on Excel's Formatting toolbar. You may also need to increase the width of Column B to display the data correctly.

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28	Sum of Camping	
29	Region	Total
30	Midwest	$ 6,958.00
31	Northeast	$ 4,896.00
32	South	$10,782.00
33	Grand Total	$22,636.00

Figure 1-6: The completed PivotTable report.

I hope that you are suitably impressed with how easy it was to create this PivotTable report. Yes, it's a simple one, but the same principles apply for more complex requirements. At this time I want to point out a couple of other aspects of PivotTable reports.

When the report is active, the PivotTable Field List is displayed. Fields that are part of the report are displayed in boldface in this list. To make the PivotTable active, click anywhere in it. To make it inactive, click somewhere else in the worksheet.

Note that the Region heading in the report has a drop-down arrow next to it. If you click this arrow Excel displays a list of all the row values as shown in Figure 1-7 — in this case, the names of the three regions, Midwest, Northeast, and South. By checking or unchecking individual items in this list, including the Show All option, you can change what the PivotTable displays.

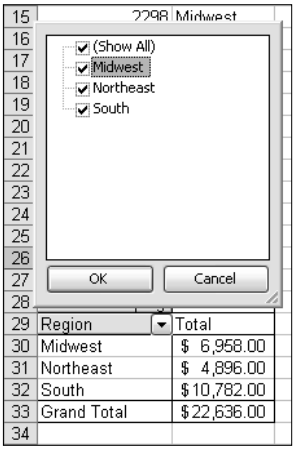

Figure 1-7: Selecting which rows to display in the PivotTable report.

For example, by selecting only the Midwest item and then clicking OK, you modify the report to show Camping category sales for the Midwest region only, as shown in Figure 1-8.

28	Sum of Camping	
29	Region	Total
30	Midwest	$6,958.00
31	Grand Total	$6,958.00

Figure 1-8: The PivotTable report customized to display only the Midwest region.

If you have changed the report to display only a single region, change it back to Show All for the next step.

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Creating a PivotTable Report with Multiple Columns

The example PivotTable presented in the previous section was about the simplest PivotTable you can create. It will be useful to go through the process of creating a somewhat more sophisticated PivotTable report, one that has multiple columns as well as rows. The data you will use is shown in Figure 1-10. It is inventory data for a chain of video-rental stores.

	A	B	C	D
1				
2	**Popcorn Video Rentals**			
3				
4	**Store**	**Category**	**Titles**	
5	Main Street	Action	374	
6	Main Street	Drama	180	
7	Main Street	Childrens	63	
8	Main Street	Sci-Fi	324	
9	Main Street	Classics	203	
10	Main Street	Comedy	145	
11	Northgate	Action	45	
12	Northgate	Drama	287	
13	Northgate	Childrens	320	
14	Northgate	Sci-Fi	36	
15	Northgate	Classics	79	
16	Northgate	Comedy	225	
17	Clarkville	Action	22	
18	Clarkville	Drama	172	
19	Clarkville	Childrens	203	
20	Clarkville	Sci-Fi	324	
21	Clarkville	Classics	251	
22	Clarkville	Comedy	345	
23	West End	Action	310	
24	West End	Drama	369	
25	West End	Childrens	220	
26	West End	Sci-Fi	236	
27	West End	Classics	145	
28	West End	Comedy	296	
29				

Figure 1-9: The video-rental store inventory data.

These raw data are organized differently from the data in the previous example. Each row in this table represents a specific category of video for a specific store. The number is the count of titles in stock for that category. The goal is to create a PivotTable report that presents this information in an easy-to-read form and to display summary information.

To begin, open the workbook `VideoStoreRawData.xls`. Use your mouse to select the data (but not the heading) — cells A4:C28. Then select PivotTable and PivotChart Wizard from the Data menu to start the wizard. (You saw this first wizard dialog box earlier in Figure 1-2.) Make sure the following options are selected:

- Microsoft Office list or database
- PivotTable

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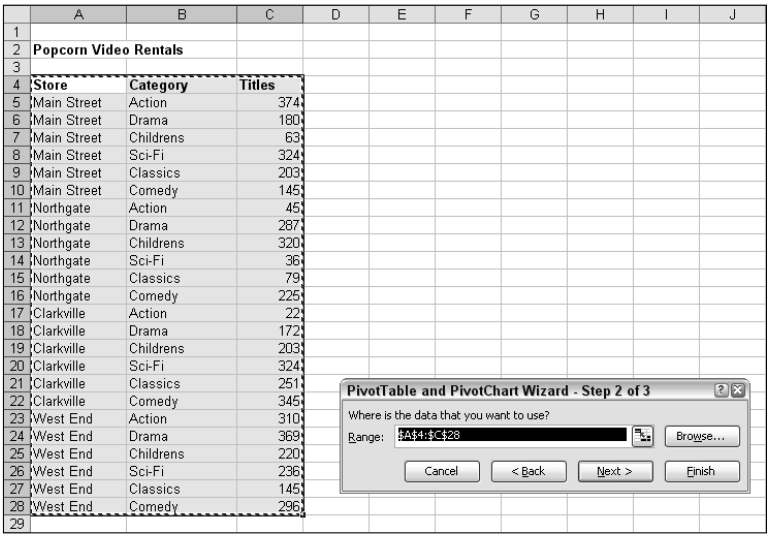
Click Next to go to the second step of the wizard. You'll see, as shown in Figure 1-10, that the range you selected earlier, A4:C28, is already entered in the Range field. This illustrates how you can select your data range before starting the PivotTable Wizard, as you have done here, or select it from the wizard, as you did in the earlier example. The results are the same either way.



Store	Category	Titles
Main Street	Action	374
Main Street	Drama	180
Main Street	Childrens	63
Main Street	Sci-Fi	324
Main Street	Classics	203
Main Street	Comedy	145
Northgate	Action	45
Northgate	Drama	287
Northgate	Childrens	320
Northgate	Sci-Fi	36
Northgate	Classics	79
Northgate	Comedy	225
Clarkville	Action	22
Clarkville	Drama	172
Clarkville	Childrens	203
Clarkville	Sci-Fi	324
Clarkville	Classics	251
Clarkville	Comedy	345
West End	Action	310
West End	Drama	369
West End	Childrens	220
West End	Sci-Fi	236
West End	Classics	145
West End	Comedy	296

Figure 1-10: If you select the data range before starting the PivotTable Wizard the range will be entered automatically.

Click Next to proceed to the third wizard step. For this example leave the default New Worksheet option selected and then click Finish. You'll see the blank PivotTable created in a new worksheet, as shown in Figure 1-11.

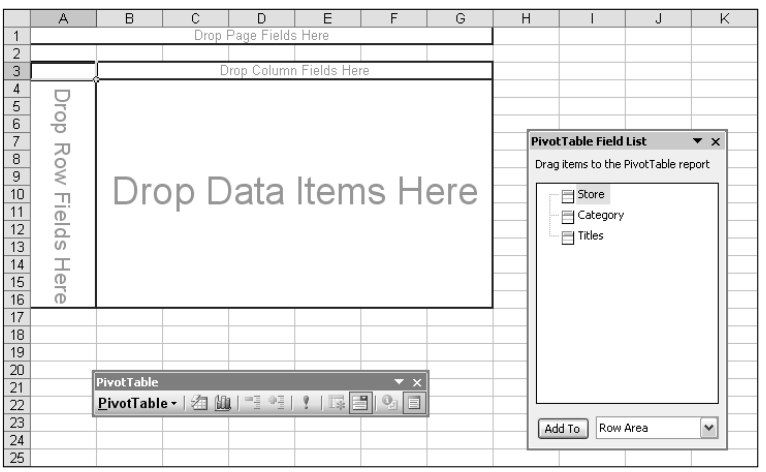


Figure 1-11: The blank PivotTable is created on a new worksheet.

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So far this looks like the step you took when you created the PivotTable in the previous example, except that the Field List contains different field names. The differences come in the next steps and are the result of the way the raw data are arranged. Here's what to do:

1. Drag the Store field from the Field List and drop it in the section of the PivotTable labeled Drop Row Fields Here.
2. Drag the Category field from the Field List and drop it in the section of the PivotTable labeled Drop Column Fields Here.
3. Drag the Titles field from the Field List and drop it in the section of the PivotTable labeled Drop Data Items Here.

The PivotTable that will result from these steps is shown in Figure 1-12.

3	Sum of Titles	Category						
4	Store	Action	Childrens	Classics	Comedy	Drama	Sci-Fi	Grand Total
5	Clarkville	22	203	251	345	172	324	1317
6	Main Street	374	63	203	145	180	324	1289
7	Northgate	45	320	79	225	287	36	992
8	West End	310	220	145	296	369	236	1576
9	Grand Total	751	806	678	1011	1008	920	5174

Figure 1-12: Excel automatically calculates and displays totals for each category and for each store, as well as an overall total.

Now you can go ahead and create a PivotChart based on this PivotTable report. Make sure the PivotTable is active; then click the Chart Wizard button on the PivotTable toolbar. The resulting chart is shown in Figure 1-13. Each store is represented by a bar in the chart, and within each bar the different categories are differentiated by color.

The Category button above the chart legend and the Store button below the horizontal axis both have drop-down arrows on them. Click an arrow to display a list of fields to include in the chart, as shown in Figure 1-14. (This works the same way as the drop-down lists in the PivotTable itself, which you saw earlier in this part.) Selecting fields to display in the chart affects the PivotTable report too. In other words, the PivotTable report and the PivotChart are linked and always display the same data.

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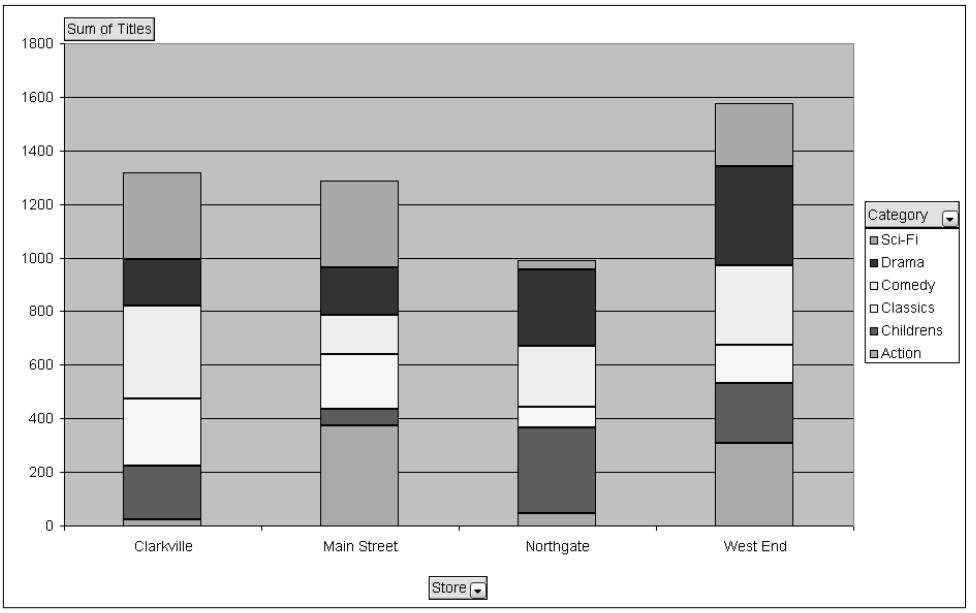

Figure 1-13: The PivotChart breaks the data down by store and by category.

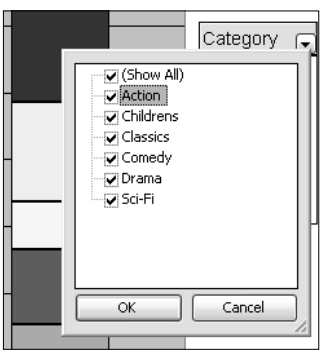

Figure 1-14: Selecting which Category fields to include in the chart.

Creating a PivotChart

A PivotChart is nothing more than a standard Excel chart created from the data in a PivotTable report. In fact there are a few features in PivotCharts that you will not find in charts based on other data — that is, data not in a PivotTable. For the most part, however, a PivotChart is like any other Excel chart and can be manipulated and formatted in the same way. The few differences will be covered as they come up.

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A PivotChart is an Excel chart based on the data in a PivotTable report. It's more than a standard Excel chart; however, because it provides many of the same customization capabilities as a report, it's easy to create a basic PivotChart. All you need to do is make the PivotTable report active and then click the Chart Wizard button on the PivotTable toolbar. Go ahead and do this now and you will see the chart shown in Figure 1-15.

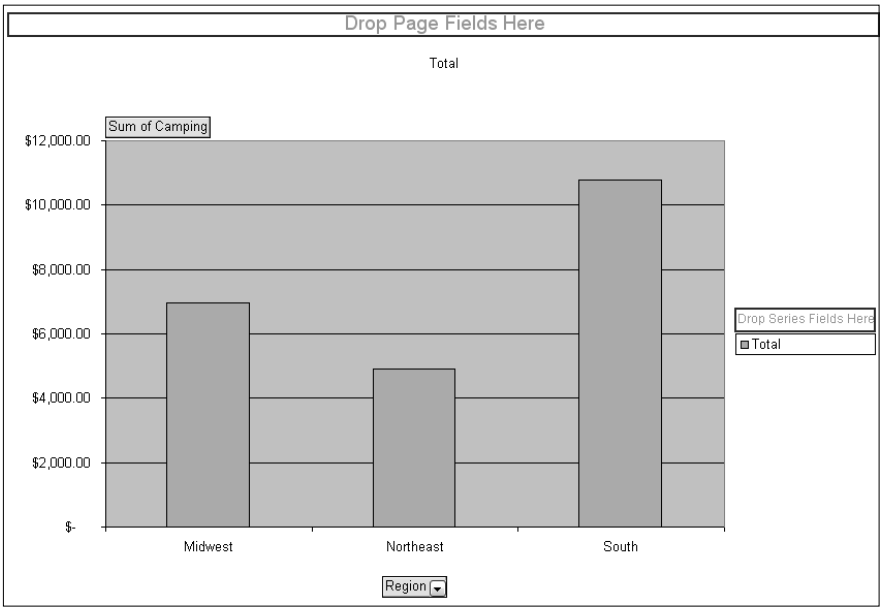

Figure 1-15: The PivotChart based on the information in the PivotTable report.

This chart has some elements that don't appear on standard Excel charts. For example, the PivotTable Field List is displayed and above the legend is a box labeled Drop Series Fields Here. These different elements are all PivotChart tools that enable you to customize which data are shown and how they are displayed. I'll be getting to these features in Part 6. For now you can experiment on your own if you wish.

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